



Human Effectiveness Directorate

Cockpit Resource Management (CRM) Training Research

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Introduction

- **CRM training is required for all Air Force Aviators**
- **CRM addresses a set of “soft” skills (AFI 11-290)**
 - **Situational awareness - Crew coordination/flight integrity**
 - **Communication decision making**
 - **Risk management/**
 - **Task management**
 - **Mission evaluation**
- **CRM training in the Air Force has traditionally focused on terms, definitions, and generic skills**
- **Little evidence that CRM training is effective**



Background

- **Naval Aviation Human Factors Working Group assessed CRM training in the Navy:**
 - **“program as currently structured is ineffective**
 - » **Single dimension**
 - » **Program not integrated into training continuum**
 - » **Transfer of skills not occurring”**
- **Naval Aviation Air Board committed \$48 million over 4 years to improve CRM training**
- **CRM training in the Air Force is no better, with the real need being to coordinate CRM across services**



Research Objectives

- **Investigate the empirical links between CRM and mission performance**
- **Identify the CRM observable behaviors that are correlated with mission success**
- **Provide prescriptive guidance to the operational community to improve CRM training**

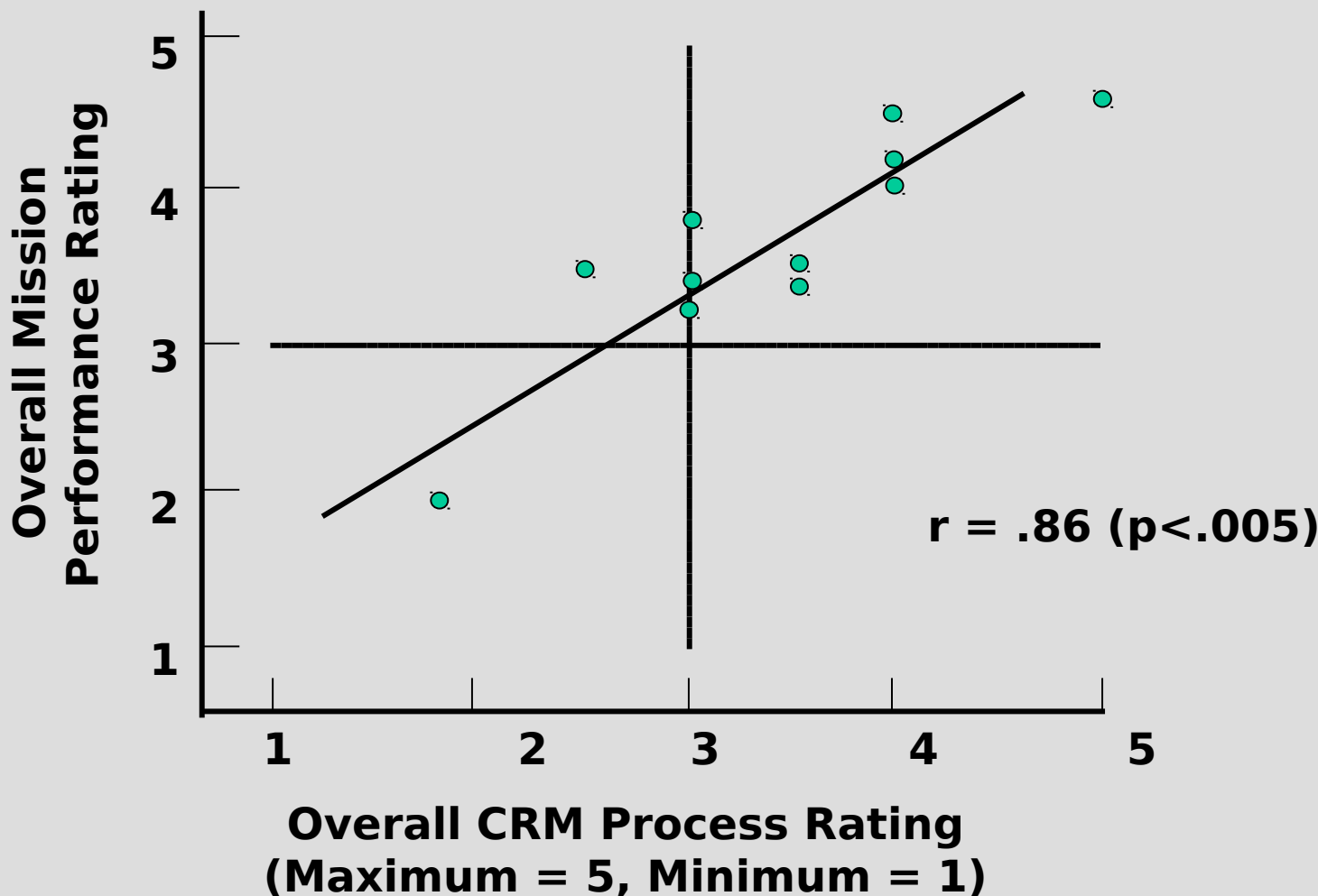


Basic Approach

- **MH-53J, MC-130P, and C-5A crews were observed as they planned and executed a mission during annual simulator training**
- **CRM behaviors rated by a SME during specific mission phases using behaviorally-anchored rating scales (BARS)**
- **Mission performance rated by a different SME for the same mission phases, again using BARS**
- **Overall CRM ratings were correlated with overall mission performance ratings**



MC-130P CRM Process and Mission Performance Relationship





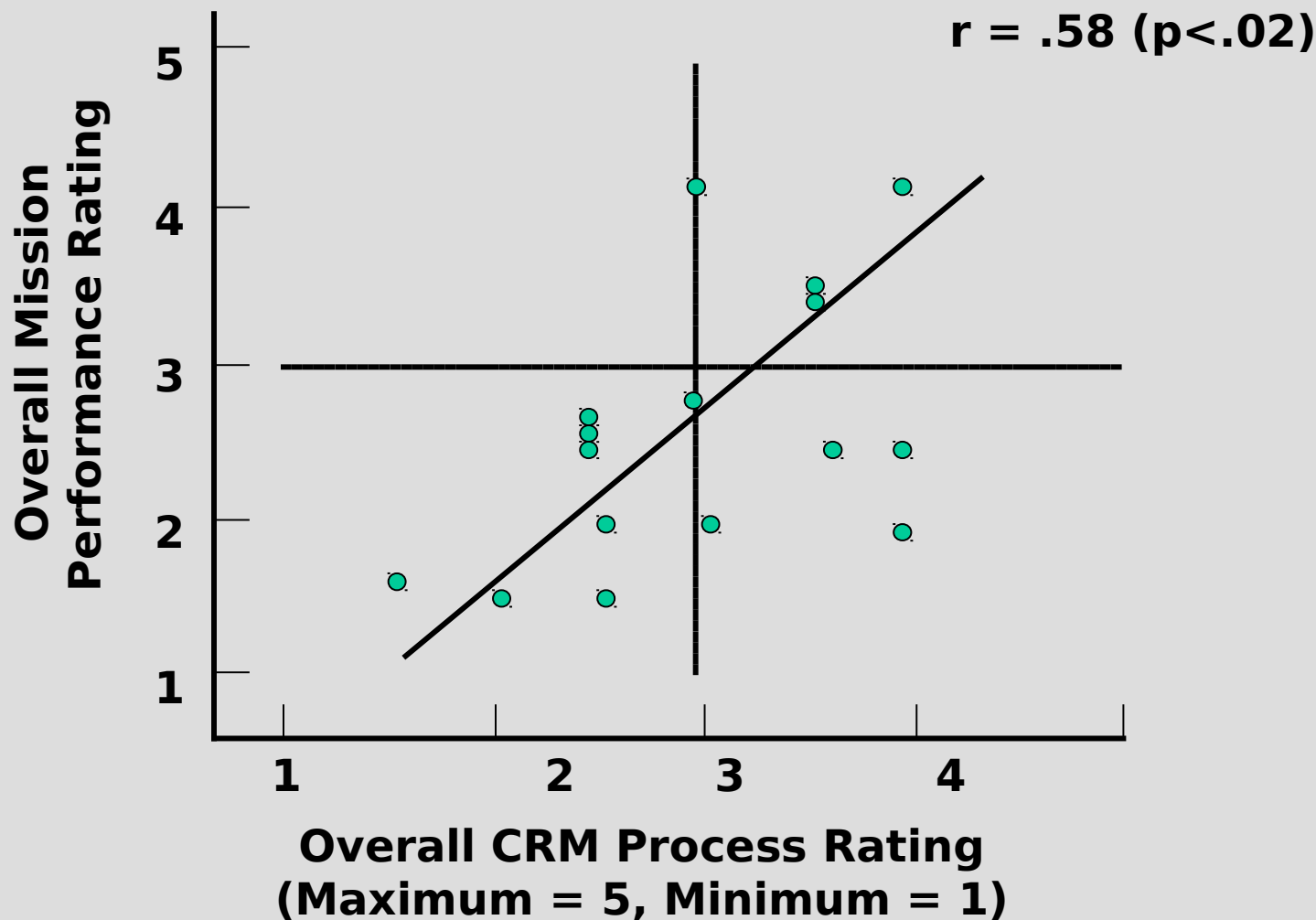
MC-130P Study Results



- **Each point represents one of 11 crews observed**
- **The dotted lines represent the minimum criterion for acceptable mission performance or CRM**
- **10 of 11 crews met or exceeded minimum mission performance levels, 9 of 11 met CRM minimums**
- **The crews given strong mission performance ratings also received the highest CRM ratings**
- **75% of variability in mission performance ratings ($.862 = .75$) can be accounted for by CRM ($p < .005$)**



C-5A CRM Process and Mission Performance Relationship





C-5A Study Results

- **Each point represents one of 16 crews observed**
- **The dotted lines represent the minimum criterion for acceptable mission performance or CRM**
- **Most crews fell below minimum desired mission performance levels**
- **Crews given low CRM ratings consistently earned sub-standard mission performance ratings**
- **33% of variability in mission performance ratings can be accounted for with CRM ratings ($p < .02$)**



Summary and Conclusions



- **CRM can be measured and analyzed when defined in terms of observable behaviors**
- **CRM and mission performance ratings highly related (33 - 75% of variance accounted for)**
- **Data patterns vary widely across platforms**
- **The specific behaviors that led to high or low CRM ratings were typically not covered in traditional Air Force CRM instruction**



Impacts

- **58 SOW/CC funding a major overhaul of CRM training for MC-130P crews to apply research findings**
- **512 AW/CC and 436 AW/CC changed C-5 operations based on study results**
- **Air Staff rewrote CRM training policy (AFI 11-290) to reflect initial research findings**
- **AETC/XP and AFRC/DO funded further CRM research**
- **The Navy has incorporated recommendations into their new CRM program plan**
- **The Navy is using these research data to justify CRM training budgets**